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Pesticide Fact Sheet Number 190
Tefluthrin

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16. Abstract (Limit: 200 words)

This document contains up-to-date chemical information, including a summary of the Agency's regulatory position and rationale, on a specific pesticide or group of pesticides. A Fact Sheet is issued after one of the the following actions has occurred.

1. Issuance or reissuance of a registration standard,
2. Issuance of each special review document,
3. Registration of a significantly changed use pattern,
4. Registration of a new chemical, or
5. An immediate need for information to resolve controversial issues relating to a specific chemical or use pattern.

17. Document Analysis a. Descriptors

Pesticides, regulations, Chemical Information Fact Sheet, Use Patterns, science findings.

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

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Office of Pesticide Programs (TS-766C)
Washington, DC 20460

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EPA Pesticide Fact Sheet

Name of Chemical: Tefluthrin
Reason for Issuance: Conditional Registration - New Chemical
Date Issued: February 3, 1989
Fact Sheet Number: 190.0

1. Description of Chemical

Generic Name: 2,3,5,6-tetrafluoro-4-methylphenyl)methyl-(1a,3a)-(Z)-(±)-3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethyl-cyclopropane carboxylate

Common Name: Tefluthrin

Trade Name: Force®

Other Proposed Names: N/A

Code Number: ICIA 0993

EPA Shaughnessy Code: 128912

Chemical Abstracts Service (CAS) Number: 79-538-32-2

Year of Initial Registration: 1989

Pesticide Type: Insecticide

Chemical Family: Pyrethroid

U.S. and Foreign Producers: ICI Americas, Inc.

2. Use Patterns and Formulations

Application Sites: Cornseeds

Types and Methods of Application: Ground Application: In-band treatment - incorporated into the top 1 inch of soil during corn planting operations.

Application Rates: Applied to corn seeds at a rate of up to 0.163 pounds active ingredient per acre overall and 0.7 lbs ai/A in the band. The product is applied once per season.

Types of Formulations: 1.5% granular and 89% technical.

Limitations:

- Registration is being approved with an expiration date of July 31, 1993. Tolerances expire July 31, 1994.
- RESTRICTED USE PESTICIDE. Toxic to fish and aquatic organisms. For retail sale to and use only by Certified Applicators, or persons under their direct supervision, and only for those uses covered by the Certified Applicator's certification.
- CROP ROTATION RESTRICTION: Do not rotate to crops other than corn.
- ENDANGERED SPECIES RESTRICTION: For ground application, do not apply this product within 20 yards of water (ponds, streams, or lakes).

3. Science Findings

Summary Science Statement: Tefluthrin is a new synthetic pyrethroid. Technical Tefluthrin exhibits high mammalian toxicity by the oral, dermal, and inhalation route of exposure. It is not considered to be mutagenic, carcinogenic, nor teratogenic in test animals. It is readily absorbed by mammals, and the majority of the residue is largely excreted in the feces and urine by 48 hours. The results of the acute toxicty on

the end-use formulation (Force) indicates the product is of moderate to low toxicity. The end use product is irritating to the eyes and can cause eye injury. Goggles or face shield are required when handling the product.

Sufficient data are available to characterize tefluthrin from an environmental and ecological effects standpoint. The results of acute oral and sub-acute dietary studies indicates that tefluthrin is practically non-toxic or slightly toxic to birds. Avian reproduction data indicates tefluthrin has no adverse effects on reproduction in birds. The results of acute toxicity studies-indicate that tefluthrin is extremely toxic to fish and other aquatic organisms. Based upon the high toxicity to aquatic organisms from laboratory tests chronic fish, aquatic invertebrate and exposure data (aquatic residue monitoring study) are being required to assess potential hazards to aquatic organisms in the environment.

Tefluthrin is very water soluble (low mobility, low runoff, and low leaching), highly lipophilic (strongly binds or adsorbs to soil organic matter) and is a very stable and persistent compound. Estimated Environmental Concentration in water is expected to be extremely low from this use but the chemical will accumulate and persist in sediment. Based upon its low mobility it is not expected to leach into groundwater.

Tefluthrin may pose a risk to endangered aquatic species. Pending a formal consultation with the Fish and Wildlife Service to determine use limitations with respect to these species, the product label consists of language which will minimize the risk to endangered species.

Chemical Characteristics:

Physical State: Crystalline solid

Color: Off white

Odor: None

Boiling Point: Decomposes at 295 °C

Melting Point: 44.6 °C (Pure), 39.4 to 43.2 °C (Technical)

Vapor Pressure: 8×10^{-6} KPa at 20 °C

Density: 1.48 g/cm^3 at 25 °C

Storage Stability: 9 months at ambient temperature

Octanol/Water Partition Coefficient: log $K_O/w = 6.5$ at 20 °C

Flammability: Flashpoint 124 °C

Solubility: Water - 0.02 ppm; Methanol - 263 g/L; Acetone, Toluene, Ethyl Acetate, Hexane, and Dicloromethane >500 g/L

Toxicology Characteristics:

Technical Formulation:

Acute Oral Toxicity-Rat: LD_{50} = 21.8 mg/kg(males); 34.6 mg/kg (females) Toxicity category I.

Acute Dermal Toxicity-Rat: LD_{50} = 316.0 mg/kg(males); 177 mg/kg (females) Toxicity category I.

Acute Inhalation Toxicity-Rat: LC_{50} = 49.1 mg/m^3(males); 37.1 mg/m^3 (females) Toxicity category I.

Primary Dermal Irritation-Rabbit: Slightly irritating, Toxicity category IV.

Primary Eye Irritation-Rabbit: (not available).

Acute Delayed Neurotoxicity - Hen: No signs of delayed neurotoxicity.

90-Day Feeding Study - Rat: NOEL = 50 ppm; LEL = 150 ppm;
Alterations in liver weight, hemoglobin and cholesterol.

90-Day Oral Dosing Study - Dog: NOEL = 0.5 mg/kg; LEL = 1.5 mg/kg;
Increased triglycerides and AST (=SGOT).

2-Year Chronic/Oncogenicity Study - Mouse: NOEL = 3.4 mg/kg;
LEL = 13.5 mg/kg; Hemangiomatous uteri and liver necrosis.
Not oncogenic at 54.4 mg/kg (MTD).

1-Year Oral Dosing Study - Dog: NOEL = 0.5 mg/kg; LEL = 2 mg/kg;
Ataxia in both sexes.

Teratogenicity - Rat: Maternal NOEL = 1 mg/kg; LEL = 3 mg/kg;
Decreased body weight at 3 mg/kg and pyrethroid toxicity at 5 mg/kg.
Developmental NOEL = 3 mg/kg; LEL = 5 mg/kg; Decreased ossifications.

Teratogenicity - Rabbit: Maternal NOEL <3 mg/kg (LDT).
Pyrethroid signs. Developmental NOEL >12 mg/kg (HDT).

Multigeneration Reproduction Study - Rat: Parental NOEL = 50 ppm;
LEL = 250 ppm; Body weight effects. Reproductive NOEL = 50 ppm;
LEL = 250 ppm; Pup weight effects.

Mutagenicity:

Reverse mutation (Salmonella [in vitro]): Not mutagenic at
5000 ug/plate (precip) in S. typhimurium strains with/without S-9.

TK Locus in L5178Y Mouse Lymphoma Cells (in vitro): Not mutagenic
up to 4000 ug/mL (cytotox).

Bone Marrow Cytogenics (Rat [in vivo]): No chromosome damage up to 12 mg/kg (cytotox).

Micronucleus (Mouse [in vivo]): No micronuclei at 50 mg/kg (single IP dose at MTD).

Dominant Lethal (Mouse [in vivo]): No dominant lethals at 10 mg/kg (MTD).

Unscheduled DNA Synthesis (Rat Hepatocytes): Absence of unscheduled DNA synthesis up to 10^{-2} M (cytotox).

End Use Formulation

The stated results for the following acute studies are for the 1.67% formulation: oral (rat), dermal (rat), inhalation (rat), primary dermal irritation (rabbit) and primary eye irritation (rabbit).

Acute Oral Toxicity - Rat: LD_{50} >2940 mg/kg (males); Approx. = 1550 mg/kg (females). Toxicity Category III.

Acute Dermal Toxicity - Rat: LD_{50} >2000 mg/kg (males and females). Toxicity Category IV.

Acute Inhalation Toxicity - Rat: 4-hour LC_{50} = 2304 mg/m^3 (females), >3929 mg/m^3 (males); Toxicity Category III.

Primary Dermal Irritation - Rabbit: Slightly irritating; Toxicity Category IV.

Primary Eye Irritation - Rabbit: Unwashed eyes showed corneal opacity, chemosis, and conjunctival discharge clearing in 4 days; Toxicity Category II.

Dermal Sensitization - Guinea Pig: Not a sensitizer.

Physiological and Biochemical Characteristics:

Foliar Absorption: N/A

Translocation: Not translocated.

Mechanism of Pesticidal Action: Neurotoxicity characteristic of pyrethroid insecticides - contact action.

Environmental Characteristics:

The environmental fate data indicate that tefluthrin and its soil-aged residues have very low vertical mobility. Tefluthrin has extremely high Kd adsorption coefficient values and 30-day aged residues in loamy sand and sandy loam soils did not move significantly beyond the top 5 inches in 35-inch soil columns. When leached with the equivalent of 66 cm of rainfall and only 0.3 percent of the applied material was found in the leachate. Based on the mobility data, tefluthrin and its degradates are not likely to leach and contaminate ground water. However, Tefluthrin is stable in water at pH 5 and 7 and stable with respect to degradation under sunlight in water and on soil with isomerization to its trans isomer being the major transformation. Also, field dissipation data indicate that tefluthrin is quite persistent with a half-life of 92 to 124 days and is even more stable under anaerobic soil conditions. Therefore, it cannot be excluded that under year by year usage and over a long period of time leaching might be observed. Field dissipation studies conducted for periods of 1 year did not indicate movement below the 10 cm depth under actual use conditions. In summary, although groundwater contamination is not likely to occur, it cannot be

totally excluded with continuous year by year usage. Fish accumulation data indicate that tefluthrin and its degradates/metabolites are not likely to accumulate significantly in fish. The confined rotation crop studies showed accumulation of ^{14}C-tefluthrin residues occurred in all rotated crops up to 410 days post-treatment with up to 0.75 lb ai/acre (not confirmed).

Reentry and spray drift data are not required since tefluthrin is applied at planting times as a band treatment and then covered with soil.

Ecological Characteristics:

Avian Oral Toxicity: Mallard Duck LD_{50} = 4190 mg/kg

Avian Dietary Toxicity: Bobwhite Quail LC_{50} = 15,000 ppm
(8 days)
Mallard Duck LC_{50} = 2317 ppm

Avian Reproduction: Dietary administration at 5 ppm and 25 ppm for 20 weeks had no adverse effects on reproduction in birds. (NOEL - 25 ppm).

Freshwater Fish Acute Toxicity: Bluegill LC_{50} = 130 parts per trillion (ppt)
(96-hr LC_{50} - tech. grade)
Rainbow Trout = 60 ppt

Freshwater Fish Acute Toxicity: Bluegill LC_{50} = 120 ppt
(96-hr LC_{50} - end-use product)
Rainbow Trout = 127 ppt

Freshwater Invertebrate Acute Toxicity: Daphnia = 70 ppt
(48-hr LC_{50} - tech. grade)

Freshwater Invertebrate Acute Toxicity: Daphnia = 185 ppt
(48-hr LC_{50} - end-use product)

Marine Fish & Invertebrate Toxicity: Sheepshead Minnow = 130 ppt
(96-hr LC_{50} tech. grade)
Mysid Shrimp = 53 ppt
Pacific Oyster = >1 ppm

Tolerance Assessment:

Tolerances have been established for residues of trefluthrin in/or on the following agricultural commodities (40 CFR 180.440). These tolerances are due to expire July 31, 1994.

Commodities	Part Per Million
Corn, grain, field and pop	0.06
Corn, forage and fodder, field and pop	0.06

The provisional acceptable daily intake (PADI), based on a NOEL of 0.75 mg/kg/day from a multigeneration reproduction study and a safety factor of 1000, is 0.00075 mg/kg body weight/day. The theoretical maximum residue contribution from the proposed tolerances is 0.00001 mg/kg body weight/day. This is equivalent to about 1.4 percent of the PADI.

Reported Pesticide Incidents: None

4. Summary of Regulatory Position and Rationale

° The Agency has determined that it should allow the conditional registration of tefluthrin for agricultural use to control insects in/on corn. Adequate data are available to assess the acute and chronic toxicological effects of tefluthrin to humans.

° Since certain long-term fish, aquatic invertebrate, aquatic exposure, and rotational crop data are missing and required, the registration is being conditionally approved with a expiration date of July 31, 1993, which coincides with the date for submission of the data required to satisfy the remaining data gaps listed below. Similarly, the tolerances have been established with an expiration date of July 31, 1994.

° In view of the high toxicity of tefluthrin to aquatic organisms (invertebrates and fish) and the potential hazard associated with exposure to this product, the Agency is concerned about exposure which may result from improper application or use and so is restricting use of this pesticide.

° The Agency has determined that endangered species labeling restrictions are necessary to protect endangered species and is requiring specific limitations on use of this product to prevent or mitigate exposure.

5. Summary of Data Gaps

	Guidelines	
Name of Study	Reference No.	Date Due
21-Day Dermal	82-2	April 1989
21-Day Feeding	82-2	April 1989
Aquatic Invertebrate Life-Cycle Test	72-4	August 1989
Aquatic Residue Level Monitoring	70-1	March 1991
Fish Life Cycle	72-5	August 1990
Rotational Crop -Field	165-2	March 1993

6. Contact Person at EPA

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DISCLAIMER: The information presented in this Pesticide Fact Sheet is for informational purposes only and may not be used to fulfill data requirements for pesticide registration and reregistration.